CLAIMS

What is claimed is:

1. A process for forming a tube clamp comprising the steps of:

layering a plurality of sheets of curable material having fibers embedded in a curable matrix to a preselected thickness along a contour of layup tooling having a predetermined shape;

curing said material to at least near net shape; then

removing said cured material from said layup tooling while retaining the shape of said layup tooling without exposing fibers.

2. The process of claim 1 wherein the step of layering of sheets further includes layering sheets of unidirectionally oriented fibers in a polymer resin matrix, and the step of removing said cured material further includes removing said cured material while maintaining the fibers along the contour of the layup tooling as continuous.

3. The process of claim 1 wherein the step of layering of sheets further includes layering sheets of woven fibers in a polymer resin matrix, and the step of removing said cured material further includes removing said cured material while maintaining the fibers along the contour of the layup tooling as continuous.

4. The process of claim 1 wherein the step of layering of sheets further includes layering sheets of randomly oriented fibers in a polymer resin matrix.

5. The process of claim 1 wherein the curable matrix is a polyimide resin matrix and the fibers are carbon fibers.

6. The process of claim1 wherein the step of layering a plurality of sheets includes layering a first plurality of sheets to a predetermined thickness to form a bottom ply layer, layering a second plurality of sheets to a predetermined thickness to form a top ply layer and sandwiching filler material between the top ply layer and the bottom ply layer.

7. The process of claim 6 wherein the filler material includes a plurality of plies cut to a predetermined shape to fill a region between the bottom ply layer and the top ply layer.

8. The process of claim 6 wherein step of layering a plurality of sheets to form a top ply layer and a bottom ply layer includes layering sheets of random fiber mat.

9. The process of claim 1 wherein the step of curing includes autoclaving said material at a predetermined temperature and pressure.

10. The process of claim 1 wherein the step of curing includes processing in a match metal press having a movable upper platen at a predetermined temperature and pressure.

11. The process of claim 1 wherein the step of curing includes resin transfer molding.

12. A process for forming a tube clamp comprising the steps of:

layering a first plurality of sheets of curable material having fibers embedded in a curable matrix to a preselected thickness along a contour of a first layup tooling having a first predetermined shape;

layering a second plurality of sheets of curable material having fibers embedded in a curable matrix to a preselected thickness along a contour of second layup tooling having a second predetermined shape, the first predetermined shape and second predetermined shape having mating interfaces;

curing said first plurality of sheets of curable material and second plurality of sheets of curable material to net shape;

removing the cured material from said first and second layup tooling while retaining the contour of said toolings having predetermined shapes without exposing fibers; and

mating said cured material from said first and second layup tooling along the mating interfaces.

13. A tube clamp made by the process of:

layering a plurality of sheets of curable material having fibers embedded in a curable matrix to a preselected thickness along a contour of layup tooling having a predetermined shape;

curing said material to at least near net shape; then

removing said cured material from said layup tooling while retaining the shape of said layup tooling without exposing fibers.

14. A tube clamp made by the process of:

layering a first plurality of sheets of curable material having fibers embedded in a curable matrix to a preselected thickness along a contour of a first layup tooling having a first predetermined shape;

layering a second plurality of sheets of curable material having fibers embedded in a curable matrix to a preselected thickness along a contour of second layup tooling having a second predetermined shape, the first predetermined shape and second predetermined shape having mating interfaces;

curing said first plurality of sheets of curable material and second plurality of sheets of curable material;

removing the cured material from said first and second layup tooling while retaining the contour of said toolings having predetermined shapes without exposing fibers.; and

mating said cured material from said first and second layup tooling along the mating interfaces.

15. A tube clamp made by the process of:

layering a plurality of sheets of curable material having fibers embedded in a curable matrix to a preselected thickness along a contour of layup tooling having a predetermined shape;

curing said material to at least near net shape; then

removing said cured material from said layup tooling while retaining the shape of said layup tooling without exposing fibers;

trimming the edges of said cured layering material; and

slicing said edge trimmed cured material into predetermined widths.

16. The tube clamp of claim 15 wherein the curable material is fibers in a polymer resin matrix.

17. The tube clamp of claim 16 wherein the polymer matrix is a polyimide resin and the fibers are carbon fibers.

18. The tube clamp of claim 16 wherein a plurality of sheets are layered into a first plurality of sheets of a predetermined thickness to form a bottom ply layer and second plurality of sheets to a predetermined thickness to form a top ply layer, and a filler material is sandwiched between the top ply layer and the bottom ply layer.

19. The tube clamp of claim 18 wherein the filler material includes a plurality of plies cut to a predetermined shape to fill a region between the bottom ply layer and the top ply layer.

20. The tube clamp of claim18 wherein the top ply layer and the bottom ply layer are formed from a plurality of sheets of random fiber mat.

21. The process of claim 19 wherein the filler material includes a plurality of plies of oriented fiber cut to a predetermined shape to fill a region between the bottom ply layer and the top ply layer.

22. The tube clamp of claim 16 wherein the curable material is cured by autoclaving at a predetermined temperature and pressure.

23. The tube clamp of claim 16 wherein the curable material is cured in a match metal press.

24. The tube clamp of claim 16 wherein the curable material is cured by resin transfer molding.

25. A tube clamp for use in a hot section of a gas turbine engine, comprising:

a first half of cured composite material, the first half having a first portion including continuous fibers embedded in a matrix , the first portion

being of a predetermined thickness to form a bottom ply layer and having a predetermined contour conforming to at least a portion of a tube and an interface, a second portion having continuous fibers embedded in a matrix, the second portion being of a predetermined thickness to form a top ply layer, and a filler material sandwiched between the top ply layer and the bottom ply layer, the first half having no exposed fibers;

a second half of cured composite material, the second half having a first portion including continuous fibers embedded in a matrix , the first portion being of a predetermined thickness to form a bottom ply layer and having a predetermined contour conforming to at least a portion of a tube and an interface corresponding to the interface of the first half, a second portion having continuous fibers embedded in a matrix, the second portion being of a predetermined thickness to form a top ply layer, and a filler material sandwiched between the top ply layer and the bottom ply layer, the second half having no exposed fibers; and

means for joining the first half to the second half.

26. The tube clamp of claim 25 wherein the matrix is a polyimide resin.

27. The tube clamp of claim 25 wherein the fibers are carbon fibers.

28. The tube clamp of claim 25 wherein the filler material is formed from random mat fiber.

29. The tube clamp of claim 25 wherein the filler material is formed from prepreg sheet having oriented fibers.

30. The tube clamp of claim 25 wherein the filler material is formed from chopped fibers and polyimide resin.